

Making sense out of 1985 and 1991 mutual events

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Astrometric observations of Jovian satellite mutual events have been published by Aksnes and colleagues for the mutual event seasons of 1973, 1979, 1985 and 1991. The 1973 and 1979 observations were published by K. Aksnes *et al.* in *AJ* **89**, **280** (1984). Corrections δt to the observed time to account, for phase effects were published by K. Aksnes *et al.* in *AJ* **92**, 1436 (1986).

The 1985 data were published by F. Franklin *et al.* in *AJ* **102**, 806 (1991). The present author initially processed those 1985 data with Galilean satellite ephemeris E-3, using the values of δt given in the paper. The 1985 data were not **employed in developing** the E-3 ephemerides, since they were unavailable at that time. He also processed the preliminary 1991 data in the same fashion, in a paper to be published by A. Kaas *et al.*

Subsequent discussions among K. Aksnes, F. Franklin, A. Kaas suggested that the 1985 and 1991 data should *not* be processed using the values of δt , since the authors believed that their 1985 paper adjusted for these phase effects.

However, the weighted sum of squares (SOS) for the 1985 and 1991 data showed large changes if the recommended value of $\delta t = 0$ were employed. The 1985 data increased the SOS by 58% if $\delta t = 0$ were employed, rather than the values given in the paper. Similarly, the 1991 data showed an increase in the SOS by 57% using $\delta t = 0$.

Subsequent communication among the participants led F. Franklin to re-examine the reduction methods employed in the 1985 and 1991 processing of mutual events. He found that the phase corrections were applied with the incorrect sign and therefore recommended that the 1985 and 1991 data should be processed using *twice* the value of the published δt values.

That is the method being employed in developing future ephemerides using the mutual events of 1985 and 1991.

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